

Having thus described the invention, what is claimed is:

CLAIMS

1. A method for emulating individual devices in a multiple device chain, said method comprising:
obtaining the topology of the chain;
selecting one device within the chain;
placing at least one other device within the chain into bypass mode; and
sending emulation instructions to the chain, wherein the emulation instructions bypass the at least one other device and are executed by the one device.
2. The method of claim 1, wherein the individual devices comprise JTAG devices and the chain includes a boundary scan chain.
3. The method of claim 2, wherein said obtaining the topology, said selecting, and said placing, are effected by the emulator.
4. The method of claim 2, wherein said selecting comprises generating a selection instruction and sending the selection instruction to the scan chain.
5. The method of claim 4, wherein the emulator includes a DEVNUM register to receive the selection instruction.
6. The method of claim 4, wherein the selection instruction comprises:
an Instruction Register Header field to retain the number of instruction register bits upstream of the one device in the scan chain;
an Instruction Register Tail field to retain the number of instruction register bits downstream of the one device in the scan chain;
a Data Register Header field to retain the number of devices upstream of the one device in the scan chain;
a Data Register Tail field to retain the number of devices downstream of the one device in the scan chain; and
a Command field to retain a command for the one device.
7. The method of claim 2, wherein said placing comprises generating a bypass instruction and sending the bypass instruction to the scan chain.

8. The method of claim 7, wherein the emulator includes a DEVALT register to receive the bypass instruction.
9. The method of claim 7, wherein the bypass instruction comprises:
 - an Instruction Register Header field to retain the number of instruction register bits upstream of the other device in the scan chain;
 - an Instruction Register Tail field to retain the number of instruction register bits downstream of the other device in the scan chain;
 - a Data Register Header field to retain the number of devices upstream of the other device in the scan chain;
 - a Data Register Tail field to retain the number of devices downstream of the other device in the scan chain; and
 - a Command field to retain a command for the one device.
10. The method of claim 1, wherein said sending emulation instructions includes placing the one device into a data mode.
11. The method of claim 10, wherein said sending emulation instructions includes formatting the emulation instructions to compensate for the at least one other device.
12. The method of claim 11, wherein said formatting includes compensating for bits added by the at least one other device.
13. The method of claim 2, wherein said obtaining the topology includes automatically determining the topology of the scan chain.
14. The method of claim 2, wherein the topology includes the number of devices in the scan chain, and the number of instruction register bits in each of the devices.
15. The method of claim 14, wherein the topology includes a device number for at least one of the devices within the scan chain.
16. The method of claim 2, wherein said selecting includes serially placing an instruction register of the one device into the scan chain.
17. The method of claim 2, wherein the emulator includes a debugger.
18. The method of claim 17, further comprising displaying a graphical representation of the scan chain.
19. The method of claim 18, wherein the graphical representation includes the topology of the scan chain.

20. The method of claim 19, wherein the topology includes the number of devices in the scan chain, and the number of instruction register bits in each of the devices.
21. The method of claim 18, wherein the graphical representation includes a device number for at least one of the devices within the scan chain.
22. The method of claim 1, coupling an emulator to the chain;
23. A graphical user interface (GUI) for an emulator configured to emulate individual devices in a multiple device chain, said GUI comprising:
- a user-selectable list of devices;
 - a graphical display of the chain; and
 - at least one chain parameter field.
24. The GUI of claim 23, wherein the individual devices comprise JTAG devices and the chain includes a boundary scan chain.
25. The GUI of claim 24, wherein said at least one device parameter field displays a parameter selected from the group consisting of: number of devices in the scan chain; number of instruction register bits in the scan chain; and a device number for at least one of the devices.
26. The GUI of claim 24, wherein said at least one device parameter field comprises a Number of Devices field, a Total Instruction Register Bit field, and a Device Number field.
27. The GUI of claim 26, wherein said Device Number field comprises a decimal format field and a hexadecimal format field.
28. The GUI of claim 24, wherein the graphical display comprises the number of devices in the scan chain, the model number of each device, the Instruction Register length of each device, and relative position of each device within the scan chain.
29. A system for emulating individual JTAG devices in a multiple device boundary scan chain, said system comprising:
- a topology module configured to obtain the topology of the scan chain;
 - a selection module configured to select one device within the scan chain;
 - a bypass module configured to place at least one other device within the scan chain into bypass mode; and
 - an emulation instruction module configured to send emulation instructions to the scan chain, wherein the emulation instructions bypass the at least one other device and are executed by the one device.

30. An article of manufacture for emulating individual JTAG devices in a multiple device boundary scan chain, said article of manufacture comprising:

a computer usable medium having a computer readable program code embodied therein, said computer readable program code including instructions for:

- obtaining a topology of the scan chain;
- selecting one device within the scan chain;
- placing at least one other device within the scan chain into bypass mode; and
- sending emulation instructions to the scan chain, wherein the emulation instructions

bypass the at least one other device and are executed by the one device.

31. Computer readable program code for emulating individual JTAG devices in a multiple device boundary scan chain, said computer readable program code comprising instructions to perform the following steps:

- obtaining the topology of the scan chain;
- selecting one device within the scan chain;
- placing at least one other device within the scan chain into bypass mode; and
- sending emulation instructions to the scan chain, wherein the emulation instructions

bypass the at least one other device and are executed by the one device.

32. A system for emulating individual JTAG devices in a multiple device boundary scan chain, said system comprising:

- a topology module configured to obtain the topology of the scan chain;
- a selection module configured to select one device within the scan chain;
- a bypass module configured to place at least one other device within the scan chain into

bypass mode;

an emulation instruction module configured to send emulation instructions to the scan chain, wherein the emulation instructions bypass the at least one other device and are executed by the one device;

at least one register configured to receive selection and bypass instructions respectively generated by the selection and bypass modules; and

a graphical user interface (GUI) including:

- a user-selectable list of JTAG devices;
- a graphical display of the scan chain; and

at least one scan chain parameter field.

33. An emulator comprising:
- an emulator connector configured to couple to a scan chain;
 - a topology module configured to obtain the topology of the scan chain;
 - a selection module configured to select one device within the scan chain;
 - a bypass module configured to place at least one other device within the scan chain into bypass mode;
 - an emulation instruction module configured to send emulation instructions to the scan chain; and
 - a translation module configured to translate the emulation instructions into a format usable by the one device;
- wherein the emulation instructions bypass the at least one other device and are executed by the one device.
34. The emulator of claim 33, wherein said translation module comprises a FPGA disposed within said emulator connector.